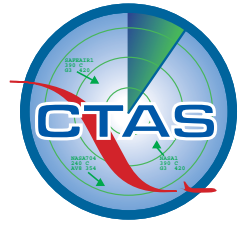# SMS

Surface Management System

Purpose:
- Create shared surface situation awareness between the ATC tower, TRACON, Center, and air carriers.
- Provide surface forecasts and advisories to aid in managing arrival surface movement and queues and to enable air carriers and ATC coordination.

Users
- Tower, TRACON and Center traffic management coordinators
- Tower controllers and supervisors
- Air carriers

Accomplishments:
- Evaluations conducted in NASA's Future Flight Central ATC tower simulator (Sept. 2001 & Jan. 2002).
- Operational demonstrations in the FedEx ramp tower at Memphis International Airport (Aug. & Oct. 2002).
- Operational trials in the Memphis ATC facilities and the FedEx ramp tower at Memphis International Airport (Sept. 2003).

Future:
- Shadow-mode field demonstration in the Memphis ATC facilities in 2004.
- Dec. 2003: OEP milestone for SMS demonstration.
- SMS is an integral component of the FAA's Free Flight Phase 2 Program.

Overview
The Surface Management System (SMS) is a decision support tool that will help controllers, traffic managers, and NAS users manage the movements of aircraft on the surface of busy airports, improving capacity, efficiency, and flexibility. The Advanced Air Transportation Technologies (AATT) Project at NASA is developing SMS in cooperation with the FAA's Free Flight Phase 2 (FFP2) program. SMS consists of three parts: a traffic management tool, a controller tool, and a National Airspace System (NAS) information tool.

Traffic Management Tool
SMS supports traffic management functions in the ATC tower, Terminal Radar Approach Control (TRACON) and Center. Accurate information about future departure demand and the resulting impact on surface operations is not currently available. SMS uses surface and airborne surveillance, along with updated air carrier pushback schedules, to predict the future demand and how that demand will affect the airport surface (e.g., what delays and queues will result and when). Shared awareness of these predictions support various traffic management decisions. For example, at airports where arrival and departure capacities are interdependent and must be coordinated, SMS predictions can be used to compare various possible traffic management actions. Interoperability between SMS and the CTAS Traffic Management Advisor (TMA) was studied during a January 2002 simulation, demonstrating the ability of TMCs to reduce arrival and departure delays when provided with better information.

Controller Tool
SMS helps Local and Ground controllers in the ATC tower construct efficient departure queues by providing runway departure advisories. SMS likewise helps ramp tower controllers in improving the efficiency with which runways are utilized by aiding in the creation of improved departure sequences and schedules. SMS also enables coordination between the ATC tower and ramp towers, for example, when a departure needs to exit an alley on the ramp before an arrival enters the ramp.

NAS Information Tool
SMS will provide surface predictions to the Enhanced Traffic Management System (ETMS) for use in traffic flow management (TFM) applications and further dissemination to NAS users. These highly accurate predictions of when aircraft will take off will result in more accurate demand predictions and will improve NAS-wide predictability. SMS landing and gate arrival time predictions support NAS user decision making.

Accomplishments
Two SMS simulations were conducted in NASA's Future Flight Central ATC tower simulator in September 2001 and January 2002. FAA controllers and air carrier representatives provided feedback to SMS researchers on the SMS concept, user interfaces, and algorithm performance, all of which was used to refine SMS.

Operational demonstrations were conducted at the FedEx ramp tower at Memphis International Airport in August and October 2002. An operational trial was conducted at Memphis Air Traffic Control Facilities (Tower, TRACON, and Center) and at the FedEx ramp tower in September 2003. During these events, the FAA's SafeFlight 21 surface surveillance prototype was used for real-time aircraft location and identification.